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II

CONTRIBUTION TO THE TERTIARY PALEONTOLOGY OF PERU

BY

G. DALLAS HANNA

AND

MERLE C. ISRAELSKY

Department of Paleontology

INTRODUCTION

In 1914 Mr. G. C. Gester collected a considerable number of Tertiary fossils in Peru and soon after presented them to the California Academy of Sciences. Dr. Roy E. Dickerson, then Curator of the Department of Paleontology, intended to prepare a report upon the collection for publication, and he identified many of the species contained therein, but before the work was completed he was called to other duties.

Later, through the kindness of Mr. John G. Burtt of the Shell Oil Company of California, another collection made in the same region by Mr. Arthur May was donated to the Academy.

The purpose of this paper is to place on record these interesting and valuable collections. Through the development of the petroleum bearing formations of northern South America during recent years much attention has been attracted to the region and several extensive reports have been published on the geology and paleontology. Large collections have been made

July 21, 1925

in Panama and Colombia as well as in Peru, and the Academy has fared exceedingly well in the distribution of these. It is believed that the publication of further technical reports on the paleontology will aid geologists materially in the field work necessary to an accurate mapping of the areas of prospective or proved productivity.

In the preparation of this report it was found necessary to prepare a checklist of species previously described and listed from the Tertiary of Peru. This has been so exceedingly helpful to us that we believe it desirable to publish it at this time in order that all references to previous systematic work may be available in one place to future workers. It has been made as nearly complete as possible and it is not believed many references have been missed. In consulting the checklist, however, it should be remembered that a considerable number of species have been listed or described from Peru from formations older than the Tertiary, from the Cretaceous down to and including the Silurian. We have not collected references to these.

We wish to express the appreciation of the Academy to Mr. Gester and Mr. Burtt for the collections concerned, and also to acknowledge our indebtedness to Dr. Dickerson for the work in the identification of species previous to our attempts.

PREVIOUS WORK

In 1909 George I. Adams¹ published "An Outline Review of the Geology of Peru" in which he gave a resumé of previous work which had been done. His bibliography (pp. 428-430) professedly incomplete, contains 41 titles; these include all the important papers on the paleontology of the region which had appeared up to that time. Since then two extensive accounts of the fossils of the Eocene and Miocene of Peru have appeared; one by Spieker², the other by Woods, Vaughan, and Cushman³. As often happens, these books were printed the same year and since there is a conflict of names it became important to know which was actually distributed first to the public. In response to inquiries made of the publishers it has

¹ Annual Report, Smithsonian Institution for 1908 (1909) pp. 385-430, 5 pls.

² Johns Hopkins University, Studies in Geology, No. 3, September 8, 1922.

³ In Bosworth, Geology of the Tertiary and Quaternary periods in the northwest part of Peru; Macmillan & Co. Ltd., London, October 3, 1922, pp. XXII, 1-434, many plates.

been learned that Spieker's paper appeared on September 8, 1922⁴; the Macmillan Company has stated that the volume by Bosworth and others was published on October 3, 1922⁵; therefore priority of publication is accredited to Spieker in the following checklist wherever a conflict has been found.

Space has not been taken to give a running list of the species in the collections, but each one is noted in its proper place in the checklist.

LIST OF COLLECTING STATIONS IN PERU

- 328.⁶ "Near the top of a small hill on the south side of Corona peak." G. C. Gester, Coll. No. 7.
- 329. "Ridge line near Corona Peak, north coast of Peru." G. C. Gester, Coll. No. 6.
- 330. "Timbes Peru:—two miles up river at top of hill." G. C. Gester, Coll. (Pleistocene.)
- 331. "Sea cliff; from a sand near the base of shale series, northeast of Punto Mero, Peru." G. C. Gester, Coll.
- 333. "Cliff near base of shale series, northeast of Punto Mero, Peru." G. C. Gester, Coll. No. 18.
- 334. "From sandy shale at Punto Sal Chico, Peru; dip. 25°-30° North." G. C. Gester, Coll.
- 335. "Punto Sal Chico, Peru." G. C. Gester, Coll.
- 336. "Near base of organic shale series at Quebrada, northeast of Moss Peak, Peru." G. C. Gester, Coll.
- 338. "Cliffs of Punto Giganta, Peru." G. C. Gester, Coll.
- 339. "Halfway up sea cliff, midway between Boca Pan and Sechunta, or about one mile northeast of Boca Pan, Peru." G. C. Gester, Coll.
- 340. "Near top of sea cliff one-fourth mile southwest of Eloisa, nearly one mile southwest of Boca Pan camp, Peru." G. C. Gester, Coll. No. 2.
- 341. "On a hill just a little southwest of Giganta Quebrada, Boca Pan, Peru." G. C. Gester, Coll. No. 3.
- 342. "South side and one mile from entrance of Culebra Orá, Peru." G. C. Gester, Coll.

⁴ Letter dated January 14, 1925, from M. L. Raney, Librarian, Johns Hopkins University to Dr. Barton W. Evermann, on file at the California Academy of Sciences.

⁵ Letter dated January 13, 1925, from Anne M. Collins, Mail Order Department, the Macmillan Company, to Dr. Barton W. Evermann, on file at the California Academy of Sciences.

⁶ All numbers refer to the catalog of the Department of Paleontology, California Academy of Sciences.

343. "One to one-and-a-fourth miles north of des embarcadero, Culebra, Ora, Peru." G. C. Gester, Coll.
344. "Near top of cliff, above No. 339, midway between Boca Pan and Sechunta, Peru." G. C. Gester, Coll.
345. "Negritos, Peru; one-fourth mile from camp." G. C. Gester, Coll.
346. "Low cliff, near base, just north of Piedros Redondas, Peru." G. C. Gester, Coll.
555. "Cavacha de Conchas, on sea cliff one mile west of Payta, Peru." G. C. Gester, Coll. No. 4.
556. "One-fourth mile southwest of Eloisa, or nearly one mile southwest of Boca Pan Well No. 2, Peru." G. C. Gester, Coll. No. 2. (Same locality as 340, above.)
850. "Quebrada Mancora, Peru; from transition beds between Heath shales and Trigal sandstone." Arthur May, Coll. No. 5.
851. "Mouth of Quebrada Mancora, northern Peru; from same horizon as No. 850." Arthur May, Coll. No. 6.
852. "One mile east of Boca de Quebrada Mancora, Peru; near base of Heath shale." Arthur May, Coll. No. 8.
853. "Bluff at beach on south side of Caleta Sal, Peru; transition zone between Heath shale and Trigal sandstone." Arthur May, Coll. No. 10.
854. "El Convento (near La Breita) Peru; Carnoas shale." Arthur May, Coll. No. 11.
855. "Massive white sandstone at Cabo Blanco, Peru." Arthur May, Coll. No. 16.
856. "At beach one mile north of Negritos, Peru; Parinas sandstone of Bosworth." Arthur May, Coll. No. 17.
857. "From the lower beds of the Upper Zorritos, Quebrada Boca Pan, Peru." Arthur May, Coll. No. 18.
858. "Lower Zorritos formation at the head of Quebrada Heath, Peru." Arthur May, Coll. No. 19.
861. "Turritella beds of the Negritos region, Peru." Arthur May, Coll. No. 25.
862. "Middle sandy Heath formation at Cerro Marinero, Peru." Arthur May, Coll. No. 26.

DESCRIPTION OF SPECIES

The two collections studied contain a few species which appear to be undescribed up to this time and a few others, already described, but for which additional important characters are shown. These are here taken up in detail.

1. *Turritella conquistadorana* Hanna & Israelsky, new species

Plate 7, figure 5

Shell acute-conic, with an apical angle of 15°; suture depressed, with a strong collar-like rib just below; three less prominent primary ribs below the collar and with minor ribs intercalated. Altitude 23.7 mm. (apex missing); diameter 5.1 mm.

Type: No. 1707, Mus. Calif. Acad. Sci. from locality No. 850 (C.A.S. coll.) "Quebrada Mancora, Peru, Eocene;" Arthur May, coll.

The new species resembles *Turritella humerosa* Conrad⁷ in general type of sculpture and apical angle, but has a much more pronounced carina and fewer primary ribs. The ribs on *Turritella merriami* Dickerson⁸ are much finer than on the new species.

2. *Turritella cochleiformis* Gabb

Plate 7, figures 6 and 7

Turritella cochleiformis GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 29.
—Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264,
pl. 35, figs. 7, 7a.

The figured specimens, Nos. 1708 and 1709 (C.A.S. coll.) came from locality No. 555 (C.A.S. coll.), "Cavacha de las Conchas, one mile west of Payta, Peru, on sea cliff." G. C. Gester, coll. It is believed that these show the characters of the species better than the original drawing.

3. *Turritella filicina varicosta* Spieker

Plate 8, figure 6

Turritella filicina var. *varicosta* SPIEKER, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 66, pl. 3, fig. 3.

Opportunity is taken to illustrate the aperture of this variation and to show the heavy callosity of the inner lip. The

⁷ Maryland Geol. Surv. Eocene, p. 148, pl. 27, figs. 1, 1a, Baltimore, Johns Hopkins Press, 1901.

⁸ Dickerson, Univ. Calif. Publ. Dept. Geol., Vol. 7, No. 12, 1913, p. 284, pl. 13, figs. 6a, 6b, 6c.

specimen figured, No. 1710 (C.A.S. coll.), is from locality No. 328 (C.A.S. coll.), "near top of a small hill south of Corona Peak, Peru." G. C. Gester, coll.

4. *Faunus paytensis* (Woods)

Plate 8, figure 8

"*Cerithium*" *paytensis* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 87, pl. 10, figs. 7-9.

The specimen here illustrated has a strong callosity on the inner lip which shows the species should probably be placed in the genus *Faunus*. The specimen figured, No. 1711 (C.A.S. coll.), is from locality No. 555 (C.A.S. coll.), "Cavacha de las Conchas, one mile west of Payta, Peru, on sea cliff." G. C. Gester, coll.

5. *Melanatria* (?) *gesteri* Hanna & Israelsky, new species

Plate 8, figures 1-3

Shell, robust, spire turreted, composed of eight post-nuclear whorls; sutures deeply impressed, bordered above and below by an irregular, rounded, spiral, ridge; body whorl with these two ridges and three smaller ones below; the uppermost of the three shows above the suture on the penultimate whorl; columella twisted, and apparently heavily calloused in full-grown specimens; these (No. 1712, C.A.S. coll.) have a decided anal sulcus in the upper angle of the aperture; peristome thin; canal of moderate length only.

Measurements in millimeters

Number	Length	Diameter
1712	64.5±5	27.5
1713	52±10	27.0
1714	55±5	26.8

Cotypes: Nos. 1712, 1713, 1714, Mus. Calif. Acad. Sci., from Loc. 334 (C.A.S. coll.) "Punta Sal Chico. Peru; Negritos [Eocene] formation;" G. C. Gester, coll.

The series of specimens available for study shows considerable variation, as would be expected in this, presumably a brackish-water inhabiting genus. The depth of the impression of the suture and the coarseness of the spiral ridges seem to be

most subject to variation of all the shell characters and the three specimens chosen for cotypes were selected to illustrate these points. There is no trace of spines on the spire such as are found in *Pseudoglaucaria lissoni* from the same formation.

It is not certain that these large shells belong to the genus *Melanatria* Bowdich, the type of which appears to have been a spineless species; but for want of a genus where they can be placed with greater positiveness it seems that this is as satisfactory disposition of them as can be made at present.

The species is named for Mr. G. C. Gester, whose field work has greatly enriched the collections of the California Academy of Sciences.

6. *Siphonalia phosoidea* Hanna & Israelsky, new species

Plate 7, figure 10; plate 8, figures 5, 7

Shell fusiform, ventricose, with apical angle of 38°, gently shouldered, with short open canal; sculpture consisting of numerous, nearly equally spaced spiral liræ, those on the base being coarser than the others; where crossed by growth lines nodules are formed; axial sculpture consisting of slightly oblique ribs which become strongest at shoulder where they form nodes (seven on body whorl); suture slightly raised, undulating; aperture elliptical, produced anteriorly into a short open siphonal canal; columella somewhat twisted; altitude 45.4 mm. (spire and canal broken); diameter 21 mm.

Type: No. 1716, Mus. Calif. Acad. Sci., from locality No. 328 (C.A.S. coll.) "near top of small hill south of Corona Peak, Peru; Zorritos formation;" G. C. Gester, coll.

Paratype: No. 1717, Mus. Calif. Acad. Sci., from locality 336 (C.A.S. coll.), from near base of organic shale series, "Quebrada northeast of Moss Peak, Peru;" Zorritos formation; G. C. Gester, coll.

We have been unable to find any closely related species with which to compare this fossil. It is placed in the genus *Siphonalia*, using that name in the broad sense in which western paleontologists have given it; if present tendencies in nomenclature persist, the species inevitably, will be placed in another group.

7. *Clavilithes(?) atahuallpai* Hanna & Israelsky, new species

Plate 7, figures 8 and 9

Shell fusoid, with body whorl longer than turreted spire; ornamented by fine spiral lines, which become rather heavy on base of body whorl; spire with apical angle of 70° and strongly noded, the body whorl slightly noded or not at all; shoulder tabulate for about 1½ whorls from aperture; aperture suboval, inclined, notched at shoulder; anterior canal open, narrow, curved, about same length as body whorl; columella vertical, flexuous; inner lip slightly calloused; umbilicus incipient; measurements of type, No. 1718: altitude 41.9 mm. (apex broken); diameter 24 mm.

Type: No. 1718, *paratype* No. 1719, Mus. Calif. Acad. Sci., from locality No. 339, "near top of a small hill south of Corona Peak, Peru; Zorritos formation;" G. C. Gester, coll.

The species has a surprising resemblance to *Macron philadelphicus* Harris⁹. As the nuclear portion of the shell is missing, the true systematic position is not known. Furthermore, certain of the characters appear fasciolaroid and the species may belong to an undescribed genus.

The species is named for Atahuallpa, the last chief of the Incas.

8. *Clavilithes burtti* Hanna & Israelsky, new species

Plate 7, figure 11

Shell broadly fusiform, heavy, early whorls strongly lirate, later ones weakly lirate; growth lines distinct; spire short; whorls sharply keeled at periphery; shoulder flat, inclined outward; suture deeply impressed; aperture ovate, opening into an open, narrow anterior canal; inner lip strongly calloused; columella nearly straight, smooth; altitude 63.4 mm., (spire and canal broken); diameter 37.3 mm.

Type: No. 1720, Mus. Calif. Acad. Sci., from locality No. 850 (C.A.S. coll.) from "Quebrada Mancora, Peru; Eocene;" Arthur May, coll.

⁹ Harris, Bull. 11, Vol. 3, Amer. Paleont., pl. 7, fig. 8.

This species may readily be distinguished from those described by Woods by its much shorter spire.

Named for Mr. John G. Burtt of the Shell Oil Company, of California, through whose efforts a considerable number of specimens were received for this study.

9. "*Surcula*" *mayi* Hanna & Israelsky, new species

Plate 7, figure 12

Shell thick, broadly fusiform; apical angle 70°; spire less than half as high as body whorl; whorls sharply angulated; fine spiral striations over whole of shell; strong nodes occur on angulation of whorls; 15 on body whorl; shoulder somewhat concave; growth lines indistinct on type; aperture ovate; inner lip heavily calloused; a low, rounded, elongated tooth is present on the columella near the upper termination of the peristome, thus resembling many members of the family *Bursidæ*; canal of moderate length, slightly twisted. Altitude 62.9 mm. (spire and canal broken); diameter 38 mm.

Type: No. 1721, Mus. Calif. Acad. Sci. from locality No. 850 (C.A.S. coll.) from "Quebrada Mancora, Peru; Eocene;" Arthur May, coll.

This species can readily be distinguished from *Surcula thompsoni* Woods¹⁰ by its greater apical angle and more numerous tubercles and from *Surcula occidentalis* Woods¹¹ by its relatively lower spire and greater angulation of the whorls.

The species is named for Mr. Arthur May, who collected it and several of the other forms described herein.

In accordance with present-day usage we have placed this large shell in the genus *Surcula*, although with a feeling that if generic discrimination continues in the future as it has of late years it must inevitably be transferred to some other group; typically, *Surcula* is a very different organism¹².

¹⁰ Woods, in Bosworth, Geology of N.W. Peru, Macmillan & Co., London, 1922, pl. 17, figs. 1, 2, 3.

¹¹ Op. Cit., pl. 16, figs. 7, 8, 9, 10.

¹² See in this connection Anderson & Hanna, Fauna of the Type Tejon Eocene, Occ. Pprs. 11, Calif. Acad. Sci., 1925, p. 82.

10. *Natica coronis* Hanna & Israelsky, new species

Plate 8, figure 4

Spire very high, composed of $5\frac{1}{2}$ whorls which are evenly rounded and symmetrical; umbilicus partially open; parietal wall covered with a greatly thickened callous deposit; suture not deeply impressed. Altitude 34 mm. (originally about 38 mm.); diameter 25 mm.

Type: No. 1715, Mus. Calif. Acad. Sci., from Loc. 328 (C.A.S. coll.) "near the top of a small hill on the south side of Corona Peak, Peru; Zorritos formation;" G. C. Gester, coll.

The exceedingly high spire of this species has made it impossible to identify it with any of those previously described from the region. It has a still higher spire than *Natica subclausa* Sowerby¹³, a very common and well known species from the Miocene of Santo Domingo, Gatun, Colombia and elsewhere.

11. *Crassatellites pizarroi* Hanna & Israelsky, new species

Plate 7, figure 1

Shell medium in size, ledaeform, ornamentation consisting of concentric ribbing and deep, well defined lunule; escutcheon present; beaks depressed; anterior end of shell well rounded, posterior elongated; length 36.4 mm.; height 22 mm.; thickness 13.2 mm.

Type: No. 1722, Mus. Calif. Acad. Sci., from locality 858 (C.A.S. coll.) "head of Quebrada Heath, Peru; Zorritos formation, Miocene;" Arthur May, coll.

The species is named for Francis Pizarro, the Spanish conqueror of Peru. It resembles in a general way *C. berryi* Spieker from the same formation, but lacks the very conspicuous concentric sculpture and the posterior angulation of that species.

¹³ Quart. Journ. Geol. Soc., Vol. 6, 1849, p. 51. See Maury, Bull. 29, Am. Paleo., 1917, p. 136, pl. 23, fig. 14, for bibliographic references and notes.

12. *Macrocallista cavachana* Hanna & Israelsky, new species

Plate 7, figure 3

Shell small, ovate, very inequilateral; beak situated about one-fourth the distance from the anterior end, incurved and prosogyrous; dorsal slopes steep, basal margin broadly rounded; lunule flat, not deeply circumscribed; escutcheon not well defined; sculpture consisting of fine, concentric striae only; hinge plate narrow, not well preserved in type; length 23.5 mm.; height 17.3 mm.; thickness, (1 valve) 5.7 mm.

Type: No. 1723, Mus. Calif. Acad. Sci., from locality No. 555 (C.A.S. coll.) "Cavacha de las Conchas, one mile west of Payta, Peru, on sea-cliff; Eocene;" G. C. Gester, coll.

The new species resembles in outline *Macrocallista helenæ* Spieker¹⁴, from the Zorritos, but lacks the comparatively heavy ribbing of that species.

13. *Chione sechuntana* Hanna & Israelsky, new species

Plate 7, figure 2

Shell small, ovate-cordiform, sub-trigonal, gibbose, radiately and concentrically ribbed; beaks prominent, inflated, incurved and directed forward, situated about a third the distance from the anterior end; anterior end short, convex; posterior slope nearly straight along hinge line; basal margin gently rounded, slightly notched posteriorly due to slight flexuosity; lunule round, well defined; escutcheon short and broad; length 21.5 mm.; height 19 mm.; diameter 15.7 mm.

Type: No. 1724, Mus. Calif. Acad. Sci., from locality No. 339 (C.A.S. coll.) "sea cliff, halfway between Boca Pan and Sechunta, one mile northeast of Boca Pan, Peru; Zorritos formation;" G. C. Gester, coll.

14. *Corbula woodsi* Hanna & Israelsky, new species

Plate 7, figure 4

Shell subtrigonal, inequivalue, the left being the larger; inequilateral, gibbose, sharply angled behind; strongly and concentrically striated; beaks prominent, the right being a little the

¹⁴ Spieker, Johns Hopkins Univ., Studies in Geology No. 3, Baltimore, 1922, p. 145, pl. 9, figs. 3, 4.

higher; both twisted inwardly and slightly forward; lunule not well defined; escutcheon long, broadly elliptical; a very deep channel, posterior to the beak tends to form a rostrum; length 17 mm.; height 13 mm.; diameter 10.1 mm.

Type: No. 1725, Mus. Calif. Acad. Sci., from Loc. No. 555 (C.A.S. coll.) "Cavacha de las Conchas, one mile west of Payta, Peru; on sea-cliff; Eocene;" G. C. Gester, coll.

Named for Dr. Henry Woods, the eminent English paleontologist, in recognition of his work on the paleontology of Peru.

It is recognized that in the deep posterior channel this shell departs from the usual *Corbula*-form, but we have not been able to place it with certainty in any other group.

CHECKLIST OF SPECIES OF PERUVIAN TERTIARY PALEONTOLOGY

In the following checklist names of genera and species are arranged alphabetically as used by the various authors. Cross references to changes in nomenclature are supplied. In the preparation of the list it has been found that several Peruvian species have been given specific names which were not valid according to the rules of nomenclature in current use and these have been renamed herein. No attempt has been made to correct the genus-names except in those cases where the species have been considered in the foregoing part of this paper, or in the identification of the two collections concerned.

The following is a list of new names proposed:

<i>Ampullina woodsi</i>	<i>Turritella supraconcava</i>
<i>Clavilithes atahuallpai</i>	<i>Area retractata</i>
<i>Clavilithes burtti</i>	<i>Cardium spiekeri</i>
<i>Columbella paytana</i>	<i>Chione sechuntana</i>
<i>Fusus talaraensis</i>	<i>Corbula talarana</i>
<i>Melanatria gesteri</i>	<i>Crassatellites pizarroi</i>
<i>Natica coronis</i>	<i>Lucina talarana</i>
<i>Siphonalia phosoidea</i>	<i>Macrocallista cavachana</i>
<i>Surcula mayi</i>	<i>Pecten incus</i>
<i>Terebra nelsoni</i>	<i>Corbula woodsi</i>
<i>Turritella conquistadorana</i>	

GASTROPODA

Ampullina gabbi Woods. See *Ampullina woodsi* HANNA & ISRAELSKY, new name.

Ampullina ortonii GABB, Amer. Journ. Conch. Vol. 5, 1869, p. 27; Payta, Peru; Tertiary.—GABB, Journ. Acad. Nat. Sci. Phila. Vol. 8, ser. 2, 1878, p. 264, pl. 35, fig. 3; (*Euspira*). [Loc. 555, C.A.S. coll.]

Ampullina paytensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 77, pl. 7, figs. 3, 4. Lobitos Formation, Eocene.

Ampullina woodsi HANNA & ISRAELSKY, new name. [Loc. 335, C.A.S. coll.]

Ampullina gabbi Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 77, pl. 7, fig. 2. Negritos Formation, Eocene.

Not *Natica* (*Ampullina*) *gabbi* CLARK, Univ. Calif. Publ. Geol. Vol. 11, 1917, p. 166, pl. 19, figs. 12, 14, 15; San Lorenzo Oligocene, California.

Aphera peruana NELSON. See *Cancellaria peruana* (NELSON).

Argobuccinum zorritense NELSON. See *Nassa zorritensis* (NELSON).

Bezauconia pupoidea Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 89, pl. 11, figs. 6-8. Negritos Formation, Eocene.

Bulla sp. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 186, not. fig'd. Zorritos, Peru.

Calliostoma noduliferum NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 187, pl. 6, fig. 1. Zorritos, Peru.

Calliostoma (*Eutrochus*) *noduliferum* NELSON, SPIEKER, Pal. Zorritos Form., Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 92, pl. 1, figs. 7, 8. Zorritos Formation, Miocene. [Loc. 556, C.A.S. coll.]

Cancellaria bradleyi NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 192, pl. 6, figs. 8, 9. Zorritos, Peru.

Cancellaria larkinii NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 192, pl. 6, fig. 7. Zorritos, Peru.

Cancellaria (*Aphera*) *peruana* (NELSON), SPIEKER, Paleontology of the Zorritos Formation Johns Hopkins Univ. Studies in Geology No. 3, p. 42, pl. 4, fig. 13. Zorritos Formation, Miocene.

Aphera peruana NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 190, pl. 6, fig. 3. Zorritos, Peru.

Cancellaria spatiosa NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 191, not fig'd. Zorritos, Peru.

Cancellaria triangularis NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 191, pl. 6, fig. 10. Zorritos, Peru.

Cerithium chatwini Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 88, pl. 11, figs. 3-5. Negritos Formation, Eocene.

Cerithium grillanum SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 57, pl. 2, fig. 10. Zorritos Formation, Miocene.

Cerithium infranodatum SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 56, pl. 2, fig. 9. Upper Zorritos Formation, Miocene.

Cerithium lœviuscum GABB, Amer. Jour. Conch. Vol. 5, 1896, p. 27, Payta, Peru, Tertiary.—GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264, pl. 35, fig. 4.

Cerithium negritosense Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 87, pl. 11, figs. 1, 2. Negritos Formation, Eocene.

"*Cerithium*" *paytense* Woods. See *Faunus paytensis* (Woods).

Clavella solidia NELSON. See *Triumphus solidia* (SPIEKER).

"*Clavilithes*" *atahuallpai* HANNA & ISRAELSKY, this paper, p. 44, pl. 7, figs. 8, 9, Zorritos Formation, Miocene.

Clavilithes burtti HANNA & ISRAELSKY, this paper, p. 44, pl. 7, fig. 11. Eocene.

Clavilithes harrisi Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 97, pl. 13, figs. 5, 6. Negritos and Lobitos Formations, Eocene.

Clavilithes incertus Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 100, pl. 14, fig. 3. Negritos Formation, (var. ? in Lobitos), Eocene.

Clavilithes pacificus Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 99, pl. 13, fig. 10; pl. 14, figs. 1, 2. Negritos and Lower Lobitos Formations, Eocene. [Loc. 850, C.A.S. coll.]

Clavilithes peruvianus Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 98, pl. 13, figs. 7-9. Negritos and Lobitos Formations, Eocene.

Columbella buccata GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 647, pl. 19, fig. 7. Talara Formation, Miocene.

Columbella longistoma GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 648, pl. 19, fig. 9. Talara Formation, Miocene.

Columbella paytana HANNA & ISRAELSKY, new name.

Columbella turrita GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 648, pl. 19, fig. 11. Talara Formation, Miocene.

Not *Columbella turrita* SOWERBY, Proc. Zool. Soc. London, 1832, p. 115.

Columbella turrita GRZYBOWSKI. See *Columbella paytana* HANNA & ISRAELSKY, new name.

Conus berryi SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 39, pl. 1, fig. 4. Lower Zorritos Formation, Miocene.

- Conus bocapanensis* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 38, pl. 1, fig. 3, Lower Zorritos Formation, Miocene.
- Conus* sp. ind., A. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 194, not fig'd. Zorritos, Peru.
- Conus cacuminatus* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 40, pl. 1, fig. 5. Upper Zorritos (?) Formation, Miocene.
- Conus* sp. ind., B, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 194, not fig'd. Zorritos, Peru.
- Conus molis* var. *bravoi* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 2, 1922, p. 41, pl. 1, fig. 6. Upper Zorritos Formation, Miocene.
- Conus* sp. ind., C. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 194, not fig'd. Zorritos, Peru.
- Conus multiliratus* var. *gaza* JOHNSON & PILSBRY, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology No. 3, 1922, p. 37. Lower Zorritos Formation, Miocene.
- Conus (Lithoconus)* sp. Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 108. Lobitos Formation, Eocene.
- Conus*, sp. ind. A, NELSON. See *Conus bocapanensis* SPIEKER.
- Conus*, sp. ind. B, NELSON. See *Conus cacuminatus* SPIEKER.
- Conus*, sp. ind. C, NELSON. See *Conus molis bravoi* SPIEKER.
- Crepidula*, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 187, not fig'd. Zorritos, Peru.
- Crucibulum inerme* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 188, not fig'd. Zorritos, Peru.
- Cuma alternata* NELSON. See *Solenosteira alternata* (NELSON).
- Cypraea angustirima* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 55, pl. 2, figs. 7, 8. Lower Zorritos Formation, Miocene.
- Diastoma americanum* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 92, pl. 12, figs. 1, 2. Negritos Formation, Eocene.
- Dientomochilus (Ectinochilus)* cf. *laqueata* (CONRAD), Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 92, pl. 12, fig. 3. Lobitos Formation, Eocene.
- Doliolum (Malea) camura* (GUPPY), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 52. Zorritos Formation, Miocene.
- Doliolum (Malea)* sp. indet., SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology No. 3, 1922, p. 53. Variegated Zorritos, Miocene.
- Eovasum peruvianum* DOUVILLE, Journ. de Conch. Vol. 66, 1921, p. 4, pl. 1, figs. 4a, 4b, 5. [Eocene], Peru.

Faunus (?) lagunitensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 86, pl. 10, figs. 4-6. Lobitos Formation, Eocene.

Faunus paytensis (Woods).

"*Cerithium*" *paytense* Woods, in BOSWORTH, Geology of Northwest Peru, 1922, p. 87, pl. 10, figs. 7-9. Lobitos Formation, Eocene.

Faunus paytense (Woods), HANNA & ISRAELSKY, this paper, p. 42, pl. 8, fig. 8. [Locs. 555, 854, C.A.S. coll.]

Fusus inflatus GRZYBOWSKI. See *Fusus talaraensis* HANNA & ISRAELSKY, new name.

Fusus paytensis GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 25.—GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264, pl. 35, figs. 1, 1a. Tertiary, Payta, Peru.

Fusus talaraensis HANNA & ISRAELSKY, new name.

Fusus inflatus GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 648, pl. 19, fig. 5. Talara Formation, Miocene.

Not *Fusus inflatus* DUNKER, PHILIPPI, Abbild. u. Beschr. Conch., Vol. 2, 1842-1851, p. 19, pl. 4, fig. 3.

(Several times otherwise preoccupied.)

Littorina laqueata GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 28. Tertiary, Payta, Peru.—GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264, pl. 35, fig. 5.

Malea, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, 1870, pt. 1, p. 196, not fig'd. Zorritos, Peru.

Marginella incrassata NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 197, pl. 6, figs. 5, 6. Zorritos, Peru.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 43, pl. 1, fig. 9. Zorritos Formation, Miocene.

Melanatria acanthica Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 84, pl. 9, figs. 12-14. Negritos Formation, Eocene.

Melanatria dimorphica Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 83, pl. 9, fig. 11. Negritos Formation, Eocene.

Melanatria gesteri HANNA & ISRAELSKY, new species; this report, p. 42.

Melanatria propinqua Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 85, pl. 10, fig. 1. Negritos Formation, Eocene.

Melanatria venusta Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 85, pl. 10, fig. 2. Negritos Formation, Eocene.

Mitra, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 197, not fig'd. Zorritos, Peru.

*Mitra labiata*¹⁵ GRZYBOWSKI, Neues Jahrbuch für Min., Geol., Pal., Bl. Bd. 12, 1899, p. 649, pl. 19, fig. 10. Talara Formation, Miocene.

¹⁵ COSSMANN & PISSARO, Iconograph, 1907-1913, Vol. 2, pl. 42, figs. 202-210, illustrate a species from the Eocene of the Paris Basin which they call *Mitra* (*Mitreola*) *labiata* (CHEMNITZ). In the limited time available for search it has not been possible to ascertain whether Grzybowski's name for the Peruvian fossil conflicts with this one or not.

- Morgania costata* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 83, pl. 9, figs. 7-10. Negritos Formations, Eocene.
- Morgania magna* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 82, pl. 9, figs. 5, 6. Negritos Formation (probably also Lower Lobitos), Eocene.
- Murex laqueoratus* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 51, pl. 2, fig. 4. Zorritos Formation, Miocene.
- Myurella tuberosa* NELSON. See *Terebra nelsoni* HANNA & ISRAELSKY, new name.
- Myurella*, sp. ind. A, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 193, not fig'd. Zorritos, Peru.
- Myurella*, sp. ind. B, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 193, not fig'd. Zorritos, Peru.
- Nassa lagunitensis* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 95, pl. 12, fig. 12, pl. 13, fig. 1. Lobitos Formation, Eocene. [Loc. 850, C.A.S. coll.]
- Nassa zorritensis* (NELSON), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 48, pl. 2, figs. 1, 2. Variegated Zorritos Formation, Miocene.
- Argobuccinum zorritense* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 196, pl. 7, figs. 1, 2. Zorritos, Peru.
- Natica coronis* HANNA & ISRAELSKY, new species, this paper, p. 46, pl. 8, fig. 4. Zorritos.
- Natica elata* GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 642, pl. 20, fig. 8. Talara Formation, Miocene.
- Natica* (*Naticina*) sp. Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 77, pl. 6, fig. 9; pl. 7, fig. 1. Lobitos Formation, Eocene.
- Oliva*, sp. ind., A, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 197, not fig'd. Zorritos, Peru.
- Oliva*, sp. ind., B, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 197, not fig'd. Zorritos, Peru.
- Olivancillaria eocenica* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 105, pl. 16, figs. 3, 4. Negritos Formation, Eocene.
- Olivancillaria* (*Agaronia*) *peruviana* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 106, pl. 16, figs. 5, 6. Lobitos Formation, Eocene. [Loc. 328, C.A.S. coll.]
- Phos* (?) *latirugatus* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies Geology, No. 3, 1922, p. 46, pl. 1, fig. 12. Lower Zorritos, Miocene.
- Pirena peruviana* DOUVILLE, Journ. de Conch. Vol. 66, 1921, p. 11, pl. 2, fig. 3 [Eocene], Peru. [In the explanation of the plate, the name *peruviana* is given as a race of *P. vellicata* Bellardi.]

Pleurotoma, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 194, not fig'd. Zorritos, Peru.

Polinices porcana SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, p. 88, pl. 4, fig. 9. Lower Zorritos Formation, Miocene.

Polinices subangulata NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 195, pl. 6, figs. 4, 12, 13. Zorritos, Peru.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 87, pl. 4, fig. 8. Lower Zorritos and Variegated Formations, Miocene.

Potamides occidentalis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 90, pl. 11, fig. 19. Negritos Formation, Eocene. [Loc. 857, C.A.S. coll.]

Potamides ormei var. *infraliratus* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 58, pl. 2, fig. 11. Lower and Upper Zorritos Formations, Miocene. [Locs. 329, 338, C.A.S. coll.]

Pseudoglaconia lissoni DOUVILLÉ, Journ. Conchyl. Vol. 66, 1921, pp. 8, 9, fig. 1, pl. 2, fig. 1. [Eocene], Peru.

Woods in BOSWORTH, Geology of Northwestern Peru, 1922, p. 85, pl. 10, fig. 3. Negritos Formation, possibly Lower Lobitos, Eocene. [Loc. 857, C.A.S. coll.]

Pseudoliva mutabilis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 94, pl. 12, figs. 7-11. Negritos Formation, Eocene. [Loc. 331, C.A.S. coll.]

Pseudoliva parinasensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 93, pl. 12, figs. 4, 6. Negritos and Lobitos Formations, Eocene. [Loc. 333, C.A.S. coll.]

Puncturella phrygia GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 642, pl. 20, figs. 12, 12a. Zorritos, Miocene.

Purpura chocolatum DUCLOS, Am. Journ. Conch., Vol. 5, 1869, p. 26, Payta, Peru, Tertiary.

Pyrula peruviana SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies Geology, No. 3, 1922, p. 54, pl. 2, figs. 5, 6. Zorritos Formation, Miocene.

Pyrula roseta GRZYBOWSKI. See *Triumphis solida* (NELSON).

Sigaretus excentricus GUPPY, GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 643, pl. 20, fig. 9. Talara Formation, Miocene.

Sinum coralatum SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 89, pl. 4, fig. 10. Lower Zorritos Formation, Miocene. [Loc. 331, C.A.S. coll.]

Siphonalia phosidea HANNA & ISRAELSKY, new species this paper, p. 43, pl. 7, fig. 10, pl. 8, figs. 5, 7. Zorritos Formation, Miocene.

- Solarium nelsoni* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 76, pl. 6, figs. 6-8. Negritos Formation, Eocene.
- Solarium sexlineare* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 194, pl. 6, fig. 11. Zorritos, Peru.—GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 642 (name spelled "sexlineatum" p. 655.), pl. 20, fig. 13. Zorritos Formation, Miocene.—Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 109, pl. 18, fig. 1. Zorritos Formation, Miocene.
- Solenosteira alternata* (NELSON) SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 45, pl. 1, figs. 10, 11. Lower Zorritos Formation, Miocene.
- Cuma alternata* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 198, pl. 7, figs. 3, 4. Zorritos, Peru.
- Strepsidura pacifica* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 96, pl. 13, figs. 2-4. Negritos and Lower Lobitos Formations, Eocene.
- Strombina lanceolata* (SOWERBY), NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 198. Zorritos, Peru.
- Strombus furcatus* GRZYBOWSKI, Neues Jahrbuch für Min. Geol. Pal. Bl. Bd. 12, 1899, pl. 20, figs. 14, 14a. Talara Formation, Miocene.
- Strombus*, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 192. Zorritos, Peru.
- Struthiolaria guttifera* GRZYBOWSKI, Neues Jahrb. für Min. Geol. Pal. Bl. Bd. 12, 1899, p. 647, pl. 19, fig. 8. Zorritos Formation, Miocene.
- "*Surcula*" *maya* HANNA & ISRAELSKY, new species, this paper, p. 45, pl. 7, fig. 12. Eocene.
- Surcula occidentalis* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 106, pl. 16, figs. 7-10. Negritos Formation, Eocene.
- Surcula thompsoni* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 107, pl. 17, figs. 1, 2. Negritos Formation, Eocene.
- Sycum americanum* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 101, pl. 14, fig. 4. Negritos Formation, Eocene.
- Telescopium peruvianum* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 91, pl. 11, figs. 13, 14. Lobitos Formation, Eocene.
- Terebra gausapata* var. *herviderana* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 35, pl. 1, fig. 1. Lower Zorritos Formation, Miocene.
- Terebra nelsoni* HANNA & ISRAELSKY, new name.
- Myurella tuberosa* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 193, not fig'd.
- Terebra tuberosa* (NELSON), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 36, pl. 1, fig. 2. Zorritos Formation, Miocene.
- Not *Terebra tuberosa* HINDS, Proc. Zool. Soc. London, 1843, p. 152.

Terebra tuberosa (NELSON). See *Terebra nelsoni* HANNA & ISRAELSKY, new name.

Tritonium pernodosum GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 26, Tertiary, Payta, Peru.—GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264, pl. 35, fig. 2.

Triumphis solida (NELSON), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies Geology, No. 3, 1922, p. 49, pl. 2, fig. 3. Lower Zorritos Formation, Miocene. [Loc. 328, C.A.S. coll.]

Clavella solida NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 199, not figured. Zorritos, Peru.

Pyrula roseta GRZYBOWSKI, Neues Jahrb. Min. Geol. Pal. Bl. Bd. 12, 1899, p. 648, pl. 19, fig. 6. Zorritos Formation.

Turbo belli SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 91, pl. 4, fig. 11. Zorritos Formation, Miocene.

Collopoma lineatum NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 187, pl. 6, fig. 2. Zorritos, Peru.

Not *Turbo lineatus* DA COSTA, Brit. Conch. 1778, p. 100.

Turbo belli var. *æquifilatum* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 92, pl. 4, fig. 12. Lower Zorritos Formation, Miocene.

Turritella sp. cf. *altilira* CONRAD, Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 110, pl. 19, figs. 2-4. Zorritos Formation, Miocene.

Turritella altilira CONRAD, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 59, pl. 2, fig. 12. Lower Zorritos Formation, Miocene. [Loc. 858, C.A.S. coll.]

Turritella altilirata CONRAD, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 645, pl. 20, fig. 7. (Spelled *altilirata* after GABB, Journ. Acad. Nat. Sci. Phila., 1877, p. 341, pl. 44, figs. 9, 9a.) Zorritos Formation, Miocene. [See *Turritella altilira* CONRAD.]

Turritella alturana SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 62, pl. 2, fig. 13 (reads 3 in text). Horizon unknown.

Turritella plana NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 188, not fig'd. Zorritos, Peru.

Not *Turritella plana*, MCCOY or BRINKHORST, 1861.

Turritella anceps Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 81, pl. 8, figs. 12, 13; pl. 9, figs. 1, 2. Negritos Formation, Eocene. [Loc. 856, C.A.S. coll.]

Turritella annectens Woods, in BOSWORTH, Geology of Northwest Peru, 1922, p. 81, pl. 9, figs. 3, 4. Negritos and Lobitos Formations, Eocene.

- Turritella bifastigata* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 189, not fig'd. Zorritos, Peru.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies Geology, No. 3, 1922, p. 63, pl. 3, fig. 1. Upper Zorritos Formation, Miocene. [Loc. 329, C.A.S. coll.]
- Turritella bosworthi* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 80, pl. 8, figs. 8-10. Negritos Formation, Eocene. [Loc. 855, C.A.S. coll.]
- Turritella charana* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 86, pl. 4, fig. 7. Lower Zorritos Formation, Miocene. [Loc. 338, C.A.S. coll.]
- Turritella cochleiformis* GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 29, Payta, Peru, Tertiary.—GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264, pl. 35, figs. 7, 7a. [Loc. 555, C.A.S. coll.]
- Turritella conquistadorana* HANNA & ISRAELSKY, new species, this paper, p. 41, pl. 7, fig. 5, Eocene.
- Turritella dickersoni* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 79, pl. 8, figs. 6, 7. Negritos Formation, Eocene. [Loc. 850, C.A.S. coll.]
- Turritella douvillei* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 80, pl. 8, fig. 11. Negritos Formation, Eocene.
- Turritella (Haustator) filicincta* GRZYBOWSKI, Neues Jahrbuch Min. Geol. Pal. Bl. Bd. 12, p. 645, pl. 20, fig. 2. Heath Formation, Miocene.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 65, pl. 3, fig. 2. Lower Zorritos Formation, Miocene.
- Turritella filicincta* var. *varicosta* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 66, pl. 3, fig. 3. Lower Zorritos Formation, Miocene. [Locs. 328, 556, C.A.S. coll.]
- Turritella (Haustator) gabiana* GRZYBOWSKI, Neues Jahrb. Min. Geol. Pal. Bl. Bd. 12, 1899, p. 646, pl. 20, fig. 11. Zorritos Formation, Miocene.
- Turritella gothica* GRZYBOWSKI, Neues Jahrbuch Min. Geol. Pal. Bl. Bd. 12, 1899, p. 645, pl. 20, fig. 10. Zorritos Formation, Miocene.—WOODS, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 110. Zorritos Formation, Miocene. [Loc. 329, C.A.S. coll.]
- Turritella inca* GRZYBOWSKI, Neues Jahrb. Min. Geol. Pal. Bl. Bd. 12, p. 644, pl. 20, fig. 1. Zorritos Formation, Miocene.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 73. Upper Zorritos or Variegated Formation, Miocene.
- Turritella inca* var. *trita* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 73, pl. 3, fig. 4. Upper Zorritos Formation, Miocene.

Turritella inconspicua GRZYBOWSKI. See *Turritella prenuncia* var. *inconspicua* GRZY.

Turritella infracarinata GRZYBOWSKI, Neues Jahrbuch Min. Geol. Pal. Bl. Bd. 12, 1899, p. 643, pl. 20, fig. 5. Zorritos Formation, Miocene.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 79, pl. 3, figs. 9, 10. Upper Zorritos Formation, Miocene. [Loc. 333, C.A.S. coll.]

Not *Turritella infracarinata* GRZYBOWSKI, Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 109, pl. 18, figs. 2, 3. See *T. nelsoni* SPIEKER.

Turritella infracarinata var. *zorritoensis* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 80, pl. 3, fig. 11. Upper Zorritos Formation, Miocene.

Turritella lissoni Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 79, pl. 8, figs. 4, 5. Negritos Formation, Eocene.

Turritella negritosensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 78, pl. 7, figs. 5-7; pl. 8, figs. 1-3. Negritos Formation, Eocene. [Locs. 345, 861, C.A.S. coll.]

Turritella nelsoni SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 74, pl. 3, figs. 5, 6. Upper Zorritos Formation, Miocene. [Locs. 328, 336, C.A.S. coll.]

Turritella suturalis NELSON (in part), Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 188, not figured. Zorritos, Peru.

Turritella infracarinata GRZYBOWSKI, Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 109, pl. 18, figs. 2, 3. Zorritos Formation, Miocene.

Turritella nelsoni var. *rotundata* GRZYBOWSKI, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 77, pl. 3, fig. 7. Upper Zorritos Formation, Miocene. *Turritella rotundata* GRZYBOWSKI, Neues Jahrb. Min. Geol. Pal. Bl. Bd. 12, p. 643, pl. 20, fig. 6. Zorritos Formation, Miocene.

Turritella suturalis NELSON (in part), Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 188.

Turritella nelsoni var. *trullissatia* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 78, pl. 3, fig. 8. Upper Zorritos Formation, Miocene.

Turritella prenuncia SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, p. 81, pl. 4, figs. 1-3. Lower Zorritos Formation, Miocene. [Loc. 331, C.A.S. coll.]

Turritella prenuncia var. *inconspicua* GRZYBOWSKI, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 83, pl. 4, fig. 4. Zorritos Formation, Miocene.

Turritella inconspicua GRZYBOWSKI, Neues Jahrbuch Min. Geol. Pal. Bl. Bd. 12, 1899, p. 644, pl. 20, fig. 4, Zorritos Formation, Miocene.

- Turritella (Haustator) robusta* GRZYBOWSKI. See *Turritella supraconcava* HANNA & ISRAELSKY, new name.
- Turritella robusta* var. *abrupta* SPIEKER. See *Turritella supraconcava* var. *abrupta* SPIEKER.
- Turritella rotundata* GRZYBOWSKI. See *Turritella nelsoni* var. *rotundata* GRZYBOWSKI.
- Turritella supraconcava* HANNA & ISRAELSKY, new name. [Loc. 555, C.A.S. coll.]
- Turritella (Haustator) robusta* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 646, pl. 20, fig. 3. Zorritos Formation, Miocene.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 84, pl. 4, fig. 5. Upper Zorritos Formation, Miocene. *Turritella*, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 190, not fig'd. Zorritos.—Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 110, pl. 18, fig. 4, pl. 19, fig. 1. Zorritos Formation, Miocene. [Loc. 555, C.A.S. coll.].
- Not *Turritella robusta* GABB, Geol. Surv. Calif. Vol. 1, 1864, p. 135, pl. 21, fig. 94. Cretaceous, California.
- Turritella supraconcava* var. *abrupta* SPIEKER.
- Turritella robusta* var. *abrupta* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 85, pl. 4, fig. 6. Zorritos Formation, Miocene.
- Turritella suturalis* NELSON. See *Turritella nelsoni* SPIEKER and *Turritella nelsoni* var. *rotundata* GRZYBOWSKI.
- Turritella tricarinata* BROCHI, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 644. Ovibo Formation, Oligocene. (This name was applied to a European fossil by Brochi.)
- Turritella* sp. ind. NELSON. See *Turritella supraconcava* HANNA & ISRAELSKY, new name.
- Tympanotonus lagunitensis* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 90, pl. 11, figs. 10-12. Lobitos Formation, Eocene.
- Uvanilla*, sp. ind., NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 187, not fig'd. Zorritos, Peru.
- Vermetus*, sp. ind., NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, 188, not fig'd. Zorritos.
- Volutilithes plicifera* GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 28. Tertiary, Payta, Peru.—GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264, pl. 35, fig. 6 (*Volutoderma*).
- Volutospina crassiuscula* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 104, pl. 15, figs. 6, 7; pl. 16, fig. 1. Negritos Formation, Eocene.
- Volutospina meridionalis* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 105, pl. 16, fig. 2. Negritos and Lower Lobitos Formations, Eocene.

Volutospina peruviana Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 101, pl. 14, figs. 5-7; pl. 15, figs. 1-5. Negritos and Lobitos Formations, Eocene. [Loc. 850, C.A.S. coll.]

PELECYPODA

Amiantis incrassata var. *ovoidalis* SACCO, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 146, pl. 9, fig. 5. Zorritos Formation?, Miocene.

Anomia berryi SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 127, pl. 7, figs. 6, 7. Upper Zorritos Formation, Miocene.

Anomia, sp. ind., NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 206, not fig'd. Zorritos, Peru.

Arca (Scapharca) charanensis SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 109, pl. 5, fig. 15. Lower Zorritos Formation, Miocene.

Arca (Noetia) cholana SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 95, pl. 5, figs. 2, 3. Variegated (near base) Formation, Miocene.

Arca (Scapharca) crescens SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 116, pl. 6, figs. 3, 4. Upper Zorritos Formation, Miocene.

Arca (Scapharca) fissicosta SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 102, pl. 5, fig. 11. Lower Zorritos Formation, Miocene.

Arca (Scapharca) hispaniolana MAURY (?), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, p. 110. Lower Zorritos Formation, Miocene.

Arca (Scapharca) imporcata SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 113, pl. 5, figs. 19, 20. Upper Zorritos Formation, Miocene.

Arca larkinii NELSON, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal., Bl. Bd. 12, 1899, p. 633.

Arca larkinii NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 204, pl. 7, figs. 5, 6, 7. Zorritos, Peru. [Locs. 329, 338, 341, 346, C.A.S. coll.]

Arca (Scapharca) larkinii NELSON, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 111, pl. 5, figs. 16-18. Horizon not known.

Not *Arca larkinii* NELSON, GRZYBOWSKI. See *Arca imporcata* SPIEKER.

Arca (Noëtia) modesta GRZYBOWSKI. See *Arca retractata* HANNA & ISRAELSKY, new name. Zorritos Formation.

- Arca (Anadara) nelsoni* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 119, pl. 6, figs. 7, 8. Upper Zorritos Formation, Miocene.
- Arca obesiformis* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 633, pl. 18, figs. 3, 3a. Zorritos Formation, Miocene.
- Arca (Scapharca) obesiformis* GRZYBOWSKI, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 115, pl. 6, figs. 1, 2. Upper Zorritos Formation, Miocene.
- Arca (Scapharca) pantheonensis* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 99, pl. 5, figs. 8, 9. Variegated Formation, Miocene.
- Arca raimondii* GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 31, Tertiary, Payta, Peru.—GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1876, p. 264, pl. 35, figs. 10, 10a.
- Arca retractata* HANNA & ISRAELSKY, new name. [Loc. 328, C.A.S. coll.]
Arca (Noëtia) modesta GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 635, pl. 18, figs. 4, 4a. Zorritos Formation, Miocene.
Not *Arca modesta* WINCHELL, Proc. Acad. Nat. Sci. Phila., 1863, p. 15.
- Arca reversa* GRAY, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 634, pl. 17, figs. 1, 1a. Payta Formation, Pliocene.
- Arca septifera* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 633, pl. 18, figs. 2, 2a. Zorritos Formation, Peru.
- Arca (Anadara) septifera* GRZYBOWSKI, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 117, pl. 6, figs. 5, 6. Upper Zorritos Formation, Miocene.
- Arca (Scapharca) singewaldi* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, p. 103, pl. 5, figs. 12, 13. Lower Zorritos Formation, Miocene.
- Arca (Scapharca) singewaldi* var. *doma* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 106. Lower Zorritos Formation, Miocene.
- Arca (Anadara) toroensis* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 121, pl. 6, figs. 9, 10; pl. 7, fig. 1. Upper Zorritos Formation, Miocene.
- Arca (Anadara) toroensis* var. *crassa* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 124, pl. 7, fig. 2. Upper Zorritos Formation, Miocene.
- Arca (Anadara) toroensis* var. *prolata* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 125, pl. 7, fig. 3. Upper Zorritos Formation, Miocene.

- Arca valdiviana* PHILIPPI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, p. 632, pl. 18, figs. 1, 1a. Zorritos Formation, Miocene.
- Arca (Scapharca) vanholsti* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 106, pl. 5, fig. 14. Lower Zorritos (base) Formation, Miocene.
- Arca (Scapharca) zapatalensis* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 101, pl. 5, fig. 10. Lower Zorritos Formation, Miocene.
- Arca (Cunearca) zorritensis* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 96, pl. 5, figs. 4, 5. Zorritos Formation, Miocene.
- Scapharca*, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, 1870, p. 205, not fig'd. Zorritos, Peru.
- Not *Scapharca zorritoensis* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 112, pl. 18, fig. 5.
- Arca (Cunearca)* sp. ind. SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 98, pl. 5, figs. 6-7. Variegated Formation, Miocene.
- Axinæa paytensis* D'ORBIGNY, GABB. See *Glycymeris paytensis* (D'ORB.) GABB.
- Barbatia* sp. Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 62, pl. 1, fig. 4. Negritos, Eocene.
- Callista (Macrocallista) dickersoni* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 71, pl. 4, fig. 6. Negritos, Eocene.
- Cardium affinis* NELSON. See *Cardium spiekeri* HANNA & ISRAELSKY, new name.
- Cardium (Trachycardium) peruvianum* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 135, pl. 8, fig. 1. Zorritos Formation, Miocene.
- Cardium*, sp. ind., NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 203, not fig'd. Zorritos, Peru.
- Cardium pertenue* GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 30. Tertiary, Payta, Peru. (Subgenus *Lævicardium*).—GABB, Journ. Acad. Nat. Sci. Phila. Ser. 2, Vol. 8, 1878, p. 264, pl. 35, figs. 9, 9a.
- Cardium procurvatum* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 638, pl. 17, figs. 2, 2a. Talara Formation, Miocene.
- Cardium spiekeri* HANNA & ISRAELSKY, new name.
- Cardium (Trigoniocardia) affinis* (NELSON), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 136, pl. 8, figs. 2, 3. Lower Zorritos Formation, Miocene.
- Hemicardia affinis* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 204, not fig'd. Zorritos, Peru.
- Not *Cardium affine* VON MÜNSTER, Neues Jahrbuch, Min., 1835, p. 438.

- Cardium subaucanum* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 637, not fig'd. Heath Formation, Miocene.
- Cardium tenuimargo* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 638, pl. 17, fig. 13. Heath Formation, Miocene.
- Cardium (Trachycardium) zorritensis* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 134, pl. 7, fig. 12. Lower Zorritos Formation, Miocene.
- Chione (Chione) angelana* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 152, pl. 9, figs. 10, 11. Upper Zorritos Formation, Miocene.
- Chione* sp. ind., B, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 203, not fig'd. Zorritos, Peru.
- Chione (Liophora) hendersonii* DALL, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 154. Lower Zorritos Formation, Miocene. [Loc. 859, C.A.S. coll.]
- Chione (Liophora) latilirata* (CONRAD), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 155. Lower Zorritos Formation, Miocene.
- Chione (Chione) propinqua* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 152, pl. 9, fig. 12. Lower Zorritos Formation, Miocene.
- Chione sechuntana* HANNA & ISRAELSKY, this paper, p. 47, pl. 7, fig. 2. Zorritos.
- Chione variabilis* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 202, not fig'd. Zorritos, Peru.—SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 150, pl. 9, figs. 8, 9. Upper Zorritos Formation, Miocene.
- Chione*, sp. ind. A, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 202, not fig'd. Zorritos, Peru.
- Chione*, sp. ind. B, NELSON. See *Chione (Chione) angelana* SPIEKER.
- Clementia dariena* (CONRAD), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 141, pl. 8, fig. 5. Lower and Upper Zorritos Formation, Miocene. [Loc. 338, C.A.S. coll.]
- ?*Harvella*, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 201, not fig'd. Zorritos, Peru.
- Clementia* sp., cf. *dariena* (CONRAD), Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 113, pl. 20, fig. 4. Zorritos Formation, Miocene.
- Corbula (Cuneocorbula) acutirostra* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 176, pl. 10, figs. 18, 19. Upper Zorritos Formation, Miocene.

Corbula arnoldi Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 74, pl. 5, figs. 7, 8. Negritos, Eocene.

Corbula bradleyi NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 200, not fig'd. Zorritos, Peru.

Corbula (Albidis) bradleyi NELSON, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, p. 171, pl. 10, figs. 13, 14. Zorritos Formation, Miocene.

Corbula (Cuneocorbula) bravoana SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 174, pl. 10, fig. 17. Lower Zorritos Formation, Miocene.

Corbula (Cuneocorbula) fabiformis SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 172, pl. 10, fig. 15. Lower Zorritos Formation, Miocene.

Corbula lanceolata GRZYBOWSKI. See *Corbula talarana* HANNA & ISRAELSKY, new name.

Corbula parinasensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 75, pl. 6, figs. 2, 3. Negritos, Eocene.

Corbula peruviana Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 73, pl. 5, figs. 4, 5. Negritos, Eocene.

Corbula (Aloidis) prenuncia SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 172, pl. 10, fig. 12. Lower Zorritos Formation, Miocene.

Corbula (Cuneocorbula) propinqua SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins, Univ. Studies in Geology, No. 3, p. 174, pl. 10, fig. 16. Variegated Formation, Miocene.

Corbula talarana HANNA & ISRAELSKY, new name.

Corbula lanceolata GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 641, pl. 17, fig. 4. Talara Formation, Miocene. Not *Corbula lanceolata* GEINITZ, Charac. Schichten Saech.—boehm. Kreide geb. 1843 (1842), p. 12, pl. 2, fig. 3.==*Anatina*.

Corbula waringi Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 74, pl. 5, fig. 6. Negritos, Eocene.

Corbula woodsi HANNA & ISRAELSKY, this paper, p. 47, pl. 7, fig. 4. Eocene.

Corbula, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 200, not fig'd. Zorritos, Peru.

Crassatellites (Scambula) berryi SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 131, pl. 7, figs. 9, 10. Lower Zorritos Formation, Miocene.

Crassatellites charanensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 112, pl. 19, fig. 6; pl. 20, figs. 1-3. Zorritos Formation, Miocene.

Crassatellites gibbosa (SOWERBY), NELSON. See *Crassatellites (Scambula) nelsoni* (GRZYBOWSKI).

Crassatellites (Scambula) nelsoni (GRZYBOWSKI), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 128, pl. 7, fig. 8. Lower Zorritos Formation, Miocene. [Loc. 858, C.A.S. coll.]

Crassatella gibbosa SOWERBY, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 203, pl. 7, fig. 9. Zorritos, Peru.

Venus nelsoni GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 639, pl. 19, figs. 2, 2a. Heath Formation, Miocene.

Crassatellites pizarroi HANNA & ISRAELSKY, this paper, p. 46, pl. 7, fig. 1. Zorritos.

Cytherea affinis GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, p. 639, not figured. Heath Formation, Miocene. This species, being unfigured, can probably not be recognized without access to the original specimens; the name is therefore not replaced herein, although it is preoccupied by *Cytherea affinis* DUJARDIN, Mem. Soc. Geol. France, Vol. 2, ser. 2, 1837, p. 260.

Cytherea planivreta GUPPY, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 639, pl. 19, fig. 3. Heath Formation, Miocene.

Dactylina chiloensis MOLINA, GABB, Amer. Journ. Conch. Vol. 5, 1869, p. 29. Tertiary, Payta, Peru.

Dosinia (Dosinidea) delicatissima BROWN & PILSBRY, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 140, not fig'd. Lower Zorritos Formation, Miocene.

Dosinia grandis NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 201, not fig'd. Zorritos Peru.

Dosinia (Dosinidea) grandis NELSON, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 138, pl. 8, fig. 4. Variegated Formation, Miocene.

Dosinia lenticula GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 639, pl. 17, fig. 11. Heath Formation, Miocene.

Glycymeris paytensis (d'ORBIGNY).

Axinæa paytensis d'ORBIGNY, GABB, Amer. Journ. Conch. Vol. 5, 1869, p. 31. Payta, Peru, Tertiary.

Pectunculus paytensis (d'ORBIGNY), GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 635. Payta Formation, Pliocene.

?*Harvella*, sp. ind. NELSON. See *Clementia dariena* (CONR.).

Hemicardia affinis NELSON. See *Cardium spiekeri* HANNA & ISRAELSKY, new name.

Labiosa (Ræta) gabbi PILSBRY & JOHNSON, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 168, pl. 10, fig. 10. Upper Zorritos Formation, 1922.

Labiosa (Ræta) ventricosa SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geol., No. 3, 1922, p. 169, pl. 10, fig. 11. Zorritos Formation, Miocene.

Leda acuminata NELSON. See *Leda peruviana* DALL.

Leda acutisinuata GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 632, pl. 17, figs. 12, 12a. Heath Formation, Miocene.

Leda ingens Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 61, pl. 1, figs. 1-3. Negritos, Eocene.

Leda peruviana DALL, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 93, pl. 5, fig. 1. Zorritos Formation, Miocene.

Leda acuminata NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 205, pl. 7, fig. 8. Zorritos, Peru. [Name pre-occupied.]

Lucina payensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 70, pl. 4, fig. 5. Lobitos, Eocene. [Loc. 555, C.A.S. coll.]

Lucina prosopтера GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 636, pl. 17, fig. 16. Heath Formation, Miocene.

Lucina pulchella GRZYBOWSKI. See *Lucina talarana* HANNA & ISRAELSKY, new name.

Lucina talarana HANNA & ISRAELSKY, new name.

Lucina pulchella GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 637, pl. 17, fig. 15, Talara Formation, Miocene.

Not *Lucina pulchella* AGASSIZ, Icon. des. Coq. Tert. 1845, p. 64; new name for *L. divaricata* LAMARCK, (not LINNAEUS).

Lutraria hortensis GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 641, pl. 19, fig. 4. Heath Formation, Miocene.

Lutraria vetula PHILIPPI, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 641. Heath Formation, Miocene.

Macrocallista helenæ SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 145, pl. 9, figs. 3, 4. Variegated Formation, Miocene.

Macrocallista cavachana HANNA & ISRAELSKY, this paper, p. 47, pl. 7, fig. 3. Eocene.

Macrocallista dickersoni Woods. See under *Callista*.

Mactra zorritensis NELSON. See *Mulinia zorritensis* (NELSON).

Mactra, sp. ind. NELSON. See *Mulinia zorritensis* (NELSON).

Meretrix bosworthi Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 72, pl. 5, fig. 1. Negritos, Eocene.

- Meretrix negritosensis* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 72, pl. 5, fig. 2; pl. 6, fig. 1. Negritos, Eocene. [Loc. 328, C.A.S., coll.]
- Mulinia zorritensis* (NELSON), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 165, pl. 10, figs. 8, 9. Zorritos Formation, Miocene.
- Mactra zorritensis* NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 201, not fig'd.
- Mactra* sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 201, not fig'd.
- Mytilus euglyphus* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 63, pl. 1, figs. 6, 7. Negritos, Eocene.
- Mytilus ungulatus* LINNÆUS, GABB, Amer. Journ. Conch. Vol. 5, 1869, p. 31. Tertiary, Payta, Peru. (A living species of the Chilian coast.)
- Nucula araucana* PHILIPPI, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 631. Talara Formation, Miocene.
- Nucula minuscula* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 632, pl. 17, fig. 10. Talara Formation, Miocene.
- Ostrea buski* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 65, pl. 2, figs. 3, 4. Negritos, Eocene. [Loc. 346, C.A.S. coll.]
- Ostrea gallus* VALENCIENNES, GABB, Amer. Journ. Conch. Vol. 5, 1869, p. 32. Tertiary, Payta, Peru.
- Ostrea inca* Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 64, pl. 1, fig. 9; pl. 2, figs. 1, 2. Negritos, Eocene.
- Ostrea iridescent* GRAY, GABB, Journ. Acad. Nat. Sci. Phila., Ser. 2, Vol. 8, 1878, p. 264. Tertiary, Payta, Peru.
- Ostrea latiareata* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 630, pl. 17, fig. 6. Heath Formation, Miocene.
- Ostrea lunaris* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 630, pl. 17, fig. 5. Payta Formation, Pliocene.
- Ostrea oculata* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 629, pl. 17, fig. 3. Payta Formation, Pliocene [Loc. 346, C.A.S.]
- Ostrea sculpta* GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 631, pl. 17, figs. 8, 8a. Heath Formation, Miocene.
- Ostrea*, sp. ind. A, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 205, not fig'd. Zorritos, Peru.
- Ostrea*, sp. ind. B, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 206, not fig'd. Zorritos, Peru.
- Ostrea*, sp. Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 65, pl. 2, fig. 5. Negritos, Eocene.
- Panopaea*, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 200, not fig'd. Zorritos, Peru.

Pecten densicinctus GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 628, pl. 17, fig. 12. Payta Formation, Pliocene.

Pecten incus HANNA & ISRAELSKY, new name. [Locs. 329, 341, C.A.S. coll.]

Pecten intercostatus GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 629, pl. 17, fig. 9. Payta Formation, Pliocene. Not *Pecten intercostatus* GRIFFITH, Syn. Char. Carb. Limestone Foss., Ireland, 1844, p. 95, pl. 18, fig. 4.

Pecten intercostatus GRZYBOWSKI. See *Pecten incus* HANNA & ISRAELSKY, new name.

Pecten paytensis GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. Vol. 12, 1899, p. 628, pl. 17, fig. 7. Payta Formation, Pliocene.

Pecten purpuratus LAMARCK, GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 32. Tertiary, Payta, Peru.

Pecten woodringi SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 125, pl. 7, figs. 4, 5. Upper Zorritos Formation, Miocene.

Pecten, sp. ind., NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 205, not fig'd. Zorritos, Peru.

Pectunculus paytensis (d'ORBIGNY), GRZYBOWSKI. See *Glycymeris paytensis*.

Perna arbolensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 65, pl. 3, fig. 1. Negritos and Lobitos, Eocene.

Phacoides (Pseudomiltha?) insleyi SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 132, pl. 7, fig. 11. Lower Zorritos, Miocene.

Pholas, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 200, not fig'd. Zorritos, Peru.

Pitaria (Lamelliconcha) cora var. *equicincta* SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 149, pl. 9, figs. 6, 7. Upper Zorritos Formation, Miocene.

Pitaria (Lamelliconcha) planivicta (GUPPY), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 147, pl. 10, fig. 6. Lower Zorritos, Variegated, Miocene.

Psammobia darwini PHILLIPI, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 640, Zorritos Formation, Miocene.

Ræta gibbosa GABB, Amer. Journ. Conch., Vol. 5, 1869, p. 30. Tertiary, Payta, Peru.—GABB, Journ. Acad. Nat. Sci. Phila. Ser. 2, Vol. 8, 1878, p. 264, pl. 35, figs. 8, 8a.—GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, p. 640, Payta Formation, Pliocene.

Scapharca (Argina) sullanensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 62, pl. 1, fig. 5. Lobitos, Eocene.

Scapharca zorritosensis Woods, in BOSWORTH, Geology of Northwestern Peru, p. 112, pl. 18, fig. 5. Zorritos, Miocene. [The spelling of the specific name differs from Spieker's *Arca zorritensis*. Loc. 346, C.A.S. coll.]

Scapharca sp. ind. NELSON. See *Arca zorritensis* SPIEKER.

Semele solida GRAY, GABB, Journ. Acad. Nat. Sci. Phila. Ser. 2, Vol. 8, 1878, p. 264. Tertiary, Payta, Peru.

Solecurtus (Pharella) planifolliculus SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 163, pl. 10, fig. 7. Lower Zorritos Formation, Miocene.

Solen microsulcatus GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, pl. 640, pl. 18, fig. 5. Ovibio Formation, Oligocene.

Strigilla prora HANLEY, GABB, Amer. Journ. Conch. Vol. 5, 1869, p. 30. Tertiary, Payta, Peru.

Tagelus gibbus (SPENGLER), SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 162. Zorritos(?) Formation, Miocene.

Solecurtus, sp. ind. NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 200, not fig'd. Zorritos, Peru.

Tellina (Eurytellina) aequicincta SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, pl. 158, pl. 10, fig. 3. Lower to Upper Zorritos, Miocene.

Tellina (Angulus) pressa DALL, SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 159, pl. 10, fig. 4. Zorritos Formation, Miocene.

Tellina, sp. ind. B, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 201, not fig'd. Zorritos, Peru.

Tellina (Angulus?) singewaldi SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 161, pl. 10, fig. 5. Lower Zorritos Formation, Miocene.

Tellina zapatalensis SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 156, pl. 10, figs. 1, 2. Lower Zorritos Formation, Miocene.

Tellina, sp. ind. A, NELSON, Trans. Conn. Acad. Arts and Sciences, Vol. 2, pt. 1, 1870, p. 201, not fig'd. Zorritos, Peru.

Tellina, sp. ind. B, NELSON. See *Tellina (Angulus) pressa* DALL.

Transenella herviderana SPIEKER, Paleontology of the Zorritos Formation, Johns Hopkins Univ. Studies in Geology, No. 3, 1922, p. 143, pl. 9, figs. 1, 2. Lower Zorritos Formation, Miocene.

Venericardia clavidens GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 636, pl. 19, figs. 1, 1a. Zorritos, Miocene. [Locs. 346, 555, C.A.S. coll.]

Venericardia planicosta LAMARCK, Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 66, pl. 3, figs. 2, 3; pl. 4, figs. 1-3. Negritos and Lobitos, Eocene.

Venus (Chione) columbensis SOWERBY, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 639. Payta Formation, Pliocene.

Venus munsteri D'ORBIGNY, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 638. Heath Formation, Miocene.

Venus nelsoni GRZYBOWSKI. See *Crassatellites (Scambula) nelsoni* (GRZYBOWSKI).

Venus saginata PHILIPPI, GRZYBOWSKI, Neues Jahrbuch, Min. Geol. Pal. Bl. Bd. 12, 1899, p. 638, Payta Formation, Pliocene.

CRUSTACEA

Callianassa parinasensis Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 114, pl. 17, fig. 4. Lobitos, Eocene.

Callianassa americana Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 115, pl. 17, figs. 5, 6. Negritos, possibly Lobitos, Eocene.

Thaumastoplax eocenica Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 117, pl. 17, fig. 11. Negritos, Eocene.

Xanthopsis errans Woods, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 115, pl. 17, figs. 7-10. Negritos, Eocene.

ECHINOIDEA

Echinocyamus intermedius HAWKINS, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 120, text fig. 25. Lobitos, Eocene.

COELENTERATA

Dendrophyllia peruviana VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 134, pl. 23, fig. 3. Negritos, Eocene.

Haimesiastrea distans VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 132, pl. 22, fig. 5. Negritos, Eocene.

Haimesiastrea humilis VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 131, pl. 22, figs. 3, 4. Negritos. Eocene.

Haimesiastrea peruviana VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 130, pl. 22, fig. 2. Negritos, Eocene.

Oculina peruviana VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 127, pl. 21, figs. 2-5. Negritos, Eocene.

Paracythus peruvianus VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 126, pl. 21, fig. 1. Negritos, Eocene.

Peruviaster VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 128. (Type *P. peruviana* VAUGHAN.)

Peruviaster peruviana VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 129, pl. 21, figs. 6, 7. Negritos, Eocene.

Stephanocænia peruviana VAUGHAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 133, pl. 23, figs. 1, 2. Negritos, Eocene.

FORAMINIFERA

Lepidocyclus antillea CUSHMAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 137, pl. 24, fig. 2. Lobitos, Eocene.

Lepidocyclus antillea (?), CUSHMAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 138.

Lepidocyclus (Nephrolepidina) peruviana CUSHMAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 138, pl. 24, fig. 1. Lobitos, Eocene.

Nummulites, sp. (?), CUSHMAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 139.

Orthophragmina peruviana, CUSHMAN, in BOSWORTH, Geology of Northwestern Peru, 1922, p. 138, pl. 24, fig. 3. Lobitos, Eocene.

PLATE 7

- Fig. 1. *Crassatellites pizarroi* HANNA & ISRAELSKY, new species, type 1722, Mus. Calif. Acad. Sci., from Loc. 858 C.A.S., Zorritos, Peru.
- Fig. 2. *Chione sechuntana* HANNA & ISRAELSKY, new species, type 1724, Mus. Calif. Acad. Sci., from locality 339 C.A.S., Zorritos, Peru.
- Fig. 3. *Macrocallista cavachana* HANNA & ISRAELSKY, new species, type 1723, Mus. Calif. Acad. Sci., from locality 555 C.A.S., Eocene, Peru.
- Fig. 4. *Corbula woodsi* HANNA & ISRAELSKY, new species, type 1725, Mus. Calif. Acad. Sci., from locality 555 C.A.S., Eocene, Peru.
- Fig. 5. *Turritella conquistadorana* HANNA & ISRAELSKY, new species, type 1707, Mus. Calif. Acad. Sci., from locality 850 C.A.S., Eocene, Peru.
- Fig. 6. *Turritella cochleiformis* GABB, plesiotype 1708, Mus. Calif. Acad. Sci., from locality 555 C.A.S., Eocene, Peru.
- Fig. 7. Same, plesiotype 1709, Mus. Calif. Acad. Sci.
- Fig. 8. "Clavilithes" *atahuallpai* HANNA & ISRAELSKY, paratype 1719, Mus. Calif. Acad. Sci., from locality 339 C.A.S., Zorritos, Peru.
- Fig. 9. Same, type 1718, Mus. Calif. Acad. Sci.
- Fig. 10. *Siphonalia phosoidea* HANNA & ISRAELSKY, new species, paratype 1717, Mus. Calif. Acad. Sci. from locality 336 C.A.S., Zorritos, Peru.
- Fig. 11. *Clavilithes burtti* HANNA & ISRAELSKY, new species, type 1720, Mus. Calif. Acad. Sci., from locality 850 C.A.S., Eocene, Peru.
- Fig. 12. "Surcula" *mayi* HANNA & ISRAELSKY, new species, type 1721, Mus. Calif. Acad. Sci., from locality 850 C.A.S., Eocene, Peru.



PLATE 8

- Fig. 1. *Melanatria* (?) *gesteri* HANNA & ISRAELSKY, new species, cotype 1712, Mus. Calif. Acad. Sci. from locality 334 C.A.S., Eocene, Peru.
- Fig. 2. *Same*, cotype 1713, Mus. Calif. Acad. Sci.
- Fig. 3. *Same*, cotype 1714, Mus. Calif. Acad. Sci.
- Fig. 4. *Natica coronis* HANNA & ISRAELSKY, new species, type 1715, Mus. Calif. Acad. Sci. from locality 328 C.A.S., Zorritos, Peru.
- Fig. 5. *Siphonalia phosoidca* HANNA & ISRAELSKY, new species, paratype 1717, Mus. Calif. Acad. Sci. from locality 336 C.A.S., Zorritos, Peru.
- Fig. 6. *Turritella filicinecta* GRZY., var. *varicosta* SPIEKER, plesiotype 1710, Mus. Calif. Acad. Sci. from locality 328 C.A.S., Zorritos, Peru. Figured to show aperture.
- Fig. 7. *Siphonalia phosoidca* HANNA & ISRAELSKY, new species, type 1716, Mus. Calif. Acad. Sci. from locality 328 C.A.S., Zorritos, Peru.
- Fig. 8. *Faunus paytense* (Woods), plesiotype 1711, Mus. Calif. Acad. Sci. from locality 555 C.A.S., Eocene, Peru. Figured to show callosity of inner lip.

